



U.S. Environmental Protection Agency  
Region 8  
Technical and Management Services

Laboratory Services Program

Certificate of Analysis

Ref: 8TMS-L

MEMORANDUM

Date: 08/14/15

Subject: Analytical Results--- **Upper Animas\_SED 5\_AUG 2015\_A096 / A-098**

From: Don Goodrich; EPA Region8 Analytical Chemistry WAM

To: Paula Schmitt  
Superfund  
8 EPR-SR

Received Sample Set(s), [Work Order : Date Received]:  
[ C150805 : 08/13/2015 ]

Attached are the analytical results for the samples received from the Upper Animas SED 5\_AUG 2015\_A096 sampling event, according to TDF A-098. All analyses were performed within their method specified holding times unless otherwise noted in the following narrative.

These samples were prepared, analyzed, and verified by the Environmental Services Assistance Team Laboratory (ESAT) according to the requirements of the Technical Direction Form (TDF).

Note: The laboratory herewith transmits this deliverable to the program/project partner for determination of "final data usability" which may include data validation and data quality assessment per and in accordance with EPA QA/G-8, *Guidance on Environmental Data Verification and Data Validation*, November 2002, EPA/240/R-02/004. Laboratory data qualifiers are applied based on the USEPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004, referred to as "NFGI".

Laboratory policy is to dispose of any remaining sample 60 days after data analysis packages are delivered to EPA. If you would like the laboratory to retain the samples for a period longer than 60 days, please contact Don Goodrich within the 60 day period at (303) 312-6687.

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**Case Narrative**

C150805

Quality Assessment: Unless indicated by exception, the QA/QC associated with this sample set produced data within the TDF-specified criteria.

Holding Times: All samples were analyzed within their method-specified technical holding time(s).

1. Initial and Continuing calibration blanks (ICBs and CCBs).  
Exceptions: None.
2. Preparation (PB) / Method blanks (MB)  
Exceptions: None.
3. Interference Checks (ICSA / ICSAB) for ICP-MS and ICP-OE analyses only.  
Exceptions: None.
4. Initial and Continuing calibration verification analyses (ICVs, SCVs and CCVs).  
Exceptions: None.
5. Laboratory Control Sample (LCS) or second source analysis or SRM.  
Exceptions: None.
6. Laboratory Fortified blank (LFB) / Blank spike (BS), same source as used for the matrix spikes.  
PBS performed with analyses/methods requiring preparation or digestion prior to analysis.  
Exceptions: None.
7. Contract Reporting Detection Limit Standard, labeled as CRA, CRDL or CRL.  
Exceptions: None.
8. Laboratory Duplicate (DUP). "Source" identifies field sample duplicated in the laboratory. If either the "source" or the duplicate result is <5X the reporting limit, the %D limit of 20% does not apply.  
Exceptions: None.
9. Laboratory Matrix Spike (MS) and spike duplicate (MSD). "Source" defines original field sample fortified prior to analysis. Percent recovery (%R) limits do not apply when sample concentration(s) exceed the corresponding analyte spike level by a factor of 4 or greater.  
Exceptions: None.
10. Serial Dilution sample analysis (SRD). "Source" is parent field sample diluted 1:5 in the laboratory. Performed for ICP-OE and ICP-MS metals analyses. Percent difference (%D) limits do not apply when analyte concentration(s) are below 50x the source sample's MDL (or 10x it's PQL).  
Exceptions: None.
11. Internal standards, criteria specified for ICP-MS analyses only, monitored at the instrument.  
Exceptions: None.
12. Any calibration using more than two-points produced a correlation coefficient equal to or greater than 0.995.  
Exceptions: None.

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## Acronyms and Definitions:

ESAT	Environmental Services Assistance Team
J	Data Estimated qualifier (also applied to all data less than PQL, greater than or equal to MDL)
MDL	Method Detection Limit
PQL	Practical Quantitation Limit, also known as reporting limit.
RPD	Relative Percent Difference (difference divided by the mean)
%D	Percent difference, serial dilution criteria unit, difference divided by the original result
%R	Percent recovery, analyzed (less sample contribution) divided by true value
<	Analyte NOT DETECTED at or above the Method Detection Limit(MDL)
mg/L	Parts per million (milligrams per liter). Solids equivalent = mg/Kg.
ug/L	Parts per billion (micrograms per liter). Solids equivalent = ug/Kg.
NR	No Recovery (matrix spike) - Often seen for calcium/magnesium when their concentration exceeds the spike level by > 4x.
NFGI	USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review/October 2004
RE	Sample Re-analysis. Usually seen on raw data and sequences for required sample dilutions due to over-range analytes.
U	Analyte not detected at or above MDL qualifier
D	Diluted value qualifier.

## Method(s) Summary :

As defined in the Technical Direction Form (TDF), some or all of the methods listed below were used for the determination of the reported target analytes.

From EPA's *Methods for the Determination of Metals in Environmental Samples*, Supplement I, May 1994, dissolved, total, and/or total recoverable metals were determined by:

- Method 200.7 / 6010B using a PE Optima ICP -OE (ICP).
- Method 200.8 / 6020 using a Perkin -Elmer Elan 6000 ICP -MS.
- Method 200.2 for total recoverable metals (only) digestion.
- Method 245.1 using a Perkin -Elmer FIMS CV AA (aqueous mercury only).

From *Standard Methods for the Examination of Water and Wastewater*, 18<sup>th</sup> Edition, 1992, Method 2340B was used for the calculated hardness determination. Hardness is reported as mg (milligram) equivalent CaCO<sub>3</sub> per liter (L) determined as follows:

$$\text{Calculated hardness} = 2.497 * (\text{Calcium, mg/L}) + 4.118 * (\text{Magnesium, mg/L}).$$

From EPA's *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846,

- Method 3015A was used for microwave assisted total metals digestion.
- Method 7473 was used for mercury in solids.

From EPA's *Determination of Inorganic Anions by Ion Chromatography*, Revision 2.1, 1993, Method 300.0 was used to determine the anions.

From EPA's *Methods for Chemical Analysis of Water and Wastes*, March 1983:

- Method 310.1 was followed for the alkalinity determination.
- Method 160.1 was followed for gravimetric total dissolved solids (TDS) determination.
- Method 160.2 was used for gravimetric total suspended solids (TSS) determination.
- Method 415.3 was used for total organic carbon (TOC) determination using either an Apollo 9000 or Phoenix 8000 Non-Dispersive IR (NDIR) system. Also known as dissolved organic carbon (DOC) when performed on the dissolved sample fraction.

The quality control procedures listed in the TDF request were utilized by ESAT to verify accuracy of the results and to evaluate any matrix interferences.

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

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## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: Field Duplicate  
EPA Tag No: 8-ADate / Time Sampled: 08/11/15 10:06  
Matrix: SedimentWorkorder: C150805  
Lab Number: C150805-01 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	< 1000	U	ug/kg dry wt	502	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	7240		ug/kg dry wt	502	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	88000		ug/kg dry wt	502	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	2480		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	4850		ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	10700		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	38600		ug/kg dry wt	502	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	158000		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	2440		ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	8240		ug/kg dry wt	502	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 2010	U	ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	< 1000	U	ug/kg dry wt	502	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	1980		ug/kg dry wt	502	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	12300		ug/kg dry wt	2010	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	4790		mg/kg dry wt	20.1	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 5.02	U	mg/kg dry wt	1.00	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	1470		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	13800		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	2960		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	2870		mg/kg dry wt	2.01	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	457	J	mg/kg dry wt	251	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	251	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	715		mg/kg dry wt	10.0	10	08/14/2015	SW	1508096

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## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE01

Date / Time Sampled: 08/11/15 10:04

Workorder: C150805

EPA Tag No: 8-A

Matrix: Sediment

Lab Number: C150805-02 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	727	J	ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	7010		ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	104000		ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	2450		ug/kg dry wt	99.6	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	3930		ug/kg dry wt	996	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	11000		ug/kg dry wt	99.6	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	43700		ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	162000		ug/kg dry wt	99.6	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	2290		ug/kg dry wt	996	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	7830		ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 1990	U	ug/kg dry wt	996	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	< 996	U	ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	< 996	U	ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	11300		ug/kg dry wt	1990	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	4600		mg/kg dry wt	19.9	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 4.98	U	mg/kg dry wt	0.996	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	1440		mg/kg dry wt	99.6	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	12600		mg/kg dry wt	99.6	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	2760		mg/kg dry wt	99.6	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	3060		mg/kg dry wt	1.99	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	443	J	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 996	U	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	716		mg/kg dry wt	9.96	10	08/14/2015	SW	1508096

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TDF #: A-098

## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE02

Date / Time Sampled: 08/11/15 10:47

Workorder: C150805

EPA Tag No: 8-A

Matrix: Sediment

Lab Number: C150805-03 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	1370		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	9240		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	99400		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	2350		ug/kg dry wt	99.9	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	6090		ug/kg dry wt	999	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	8210		ug/kg dry wt	99.9	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	74700		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	203000		ug/kg dry wt	99.9	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	2560		ug/kg dry wt	999	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	7040		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	999	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	865	J	ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	< 999	U	ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	16000		ug/kg dry wt	2000	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	5400		mg/kg dry wt	20.0	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	0.999	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	3100		mg/kg dry wt	99.9	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	17200		mg/kg dry wt	99.9	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	3320		mg/kg dry wt	99.9	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	2210		mg/kg dry wt	2.00	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	665	J	mg/kg dry wt	250	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 999	U	mg/kg dry wt	250	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	828		mg/kg dry wt	9.99	10	08/14/2015	SW	1508096

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

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TDF #: A-098

## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE03

Date / Time Sampled: 08/11/15 12:38

Workorder: C150805

EPA Tag No: 8-A

Matrix: Sediment

Lab Number: C150805-04 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	947	J	ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	10500		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	111000		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	2670		ug/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	6340		ug/kg dry wt	995	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	8450		ug/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	81900		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	242000		ug/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	2890		ug/kg dry wt	995	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	7430		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 1990	U	ug/kg dry wt	995	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	1130		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	< 995	U	ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	15600		ug/kg dry wt	1990	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	6070		mg/kg dry wt	19.9	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 4.97	U	mg/kg dry wt	0.995	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	3710		mg/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	17700		mg/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	3720		mg/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	2140		mg/kg dry wt	1.99	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	765	J	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 995	U	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	878		mg/kg dry wt	9.95	10	08/14/2015	SW	1508096

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## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE04

Date / Time Sampled: 08/11/15 14:20

Workorder: C150805

EPA Tag No: 8-A

Matrix: Sediment

Lab Number: C150805-05 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	1050		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	10300		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	113000		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	2510		ug/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	5520		ug/kg dry wt	995	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	8390		ug/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	68300		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	218000		ug/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	2730		ug/kg dry wt	995	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	7590		ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 1990	U	ug/kg dry wt	995	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	933	J	ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	< 995	U	ug/kg dry wt	497	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	16400		ug/kg dry wt	1990	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	5360		mg/kg dry wt	19.9	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 4.97	U	mg/kg dry wt	0.995	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	8900		mg/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	16400		mg/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	3520		mg/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	2150		mg/kg dry wt	1.99	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	678	J	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 995	U	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	783		mg/kg dry wt	9.95	10	08/14/2015	SW	1508096



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TDF #: A-098

## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE05

Date / Time Sampled: 08/11/15 14:56

Workorder: C150805

EPA Tag No: 8-A

Matrix: Sediment

Lab Number: C150805-06 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	655	J	ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	8540		ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	208000		ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	1630		ug/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	5880		ug/kg dry wt	995	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	6780		ug/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	43600		ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	114000		ug/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	2970		ug/kg dry wt	995	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	12200		ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 1990	U	ug/kg dry wt	995	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	756	J	ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	< 995	U	ug/kg dry wt	498	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	17500		ug/kg dry wt	1990	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	5090		mg/kg dry wt	19.9	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 4.98	U	mg/kg dry wt	0.995	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	29300		mg/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	17400		mg/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	6560		mg/kg dry wt	99.5	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	1230		mg/kg dry wt	1.99	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	839	J	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 995	U	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	489		mg/kg dry wt	9.95	10	08/14/2015	SW	1508096

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE06

Date / Time Sampled: 08/11/15 15:38

Workorder: C150805

EPA Tag No: 8-A

Matrix: Sediment

Lab Number: C150805-07 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	1270		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	15600		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	151000		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	4220		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	8100		ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	11700		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	118000		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	306000		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	2860		ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	11400		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	1880		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	20300		ug/kg dry wt	2000	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	8930		mg/kg dry wt	20.0	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	1.00	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	11000		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	24800		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	5510		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	2210		mg/kg dry wt	2.00	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	1080		mg/kg dry wt	250	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	250	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	1240		mg/kg dry wt	10.0	10	08/14/2015	SW	1508096

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE07

Date / Time Sampled: 08/11/15 16:41

Workorder: C150805

EPA Tag No: 8-A

Matrix: Sediment

Lab Number: C150805-08 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	721	J	ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	8670		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	133000		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	1910		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	6090		ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	7750		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	58700		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	156000		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	2630		ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	8150		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	1120		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	20100		ug/kg dry wt	2000	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	5700		mg/kg dry wt	20.0	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	1.00	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	12900		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	18000		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	4090		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	1720		mg/kg dry wt	2.00	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	744	J	mg/kg dry wt	250	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	250	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	759		mg/kg dry wt	10.0	10	08/14/2015	SW	1508096

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE08

Date / Time Sampled: 08/11/15 17:00

Workorder: C150805

EPA Tag No: 8-A

Matrix: Sediment

Lab Number: C150805-09 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	992	J	ug/kg dry wt	499	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	8450		ug/kg dry wt	499	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	109000		ug/kg dry wt	499	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	1990		ug/kg dry wt	99.8	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	4830		ug/kg dry wt	998	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	8160		ug/kg dry wt	99.8	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	55400		ug/kg dry wt	499	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	197000		ug/kg dry wt	99.8	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	4660		ug/kg dry wt	998	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	6890		ug/kg dry wt	499	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	998	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	704	J	ug/kg dry wt	499	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	< 998	U	ug/kg dry wt	499	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	14300		ug/kg dry wt	2000	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	4730		mg/kg dry wt	20.0	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 4.99	U	mg/kg dry wt	0.998	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	5230		mg/kg dry wt	99.8	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	15300		mg/kg dry wt	99.8	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	2920		mg/kg dry wt	99.8	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	2130		mg/kg dry wt	2.00	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	551	J	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 998	U	mg/kg dry wt	249	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	943		mg/kg dry wt	9.98	10	08/14/2015	SW	1508096

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

## Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE09

Date / Time Sampled: 08/11/15 18:24

Workorder: C150805

EPA Tag No: 8-A

Matrix: Sediment

Lab Number: C150805-10 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
EPA 200.2 / 200.8	Antimony	894	J	ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Arsenic	8290		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Barium	147000		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cadmium	1820		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Chromium	4420		ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Cobalt	8650		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Copper	52800		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Lead	200000		ug/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Molybdenum	3060		ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Nickel	6520		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	1000	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Silver	1160		ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	500	10	08/14/2015	SW	1508096
EPA 200.2 / 200.8	Vanadium	12900		ug/kg dry wt	2000	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Aluminum	4530		mg/kg dry wt	20.0	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	1.00	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Calcium	5490		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Iron	14500		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Magnesium	2780		mg/kg dry wt	100	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Manganese	2520		mg/kg dry wt	2.00	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Potassium	531	J	mg/kg dry wt	250	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	250	10	08/14/2015	SW	1508096
EPA 200.2/200.7	Zinc	1040		mg/kg dry wt	10.0	10	08/14/2015	SW	1508096

"J" Qualifier indicates an estimated value

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

## Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: Field Duplicate  
EPA Tag No: 8-ADate / Time Sampled: 08/11/15 10:06  
Matrix: SedimentWorkorder: C150805  
Lab Number: C150805-01 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.033		mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

## Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSE01  
EPA Tag No: 8-ADate / Time Sampled: 08/11/15 10:04  
Matrix: SedimentWorkorder: C150805  
Lab Number: C150805-02 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	< 0.020	U	mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

## Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSE02  
EPA Tag No: 8-ADate / Time Sampled: 08/11/15 10:47  
Matrix: SedimentWorkorder: C150805  
Lab Number: C150805-03 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.018	J	mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

## Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSE03  
EPA Tag No: 8-ADate / Time Sampled: 08/11/15 12:38  
Matrix: SedimentWorkorder: C150805  
Lab Number: C150805-04 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.011	J	mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

## Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSE04  
EPA Tag No: 8-ADate / Time Sampled: 08/11/15 14:20  
Matrix: SedimentWorkorder: C150805  
Lab Number: C150805-05 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.012	J	mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

## Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSE05  
EPA Tag No: 8-ADate / Time Sampled: 08/11/15 14:56  
Matrix: SedimentWorkorder: C150805  
Lab Number: C150805-06 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.032		mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

## Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSE06  
EPA Tag No: 8-ADate / Time Sampled: 08/11/15 15:38  
Matrix: SedimentWorkorder: C150805  
Lab Number: C150805-07 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.049		mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

## Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSE07  
EPA Tag No: 8-ADate / Time Sampled: 08/11/15 16:41  
Matrix: SedimentWorkorder: C150805  
Lab Number: C150805-08 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.020		mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSE08  
EPA Tag No: 8-A

Date / Time Sampled: 08/11/15 17:00  
Matrix: Sediment

Workorder: C150805  
Lab Number: C150805-09 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.010	J	mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSE09  
EPA Tag No: 8-A

Date / Time Sampled: 08/11/15 18:24  
Matrix: Sediment

Workorder: C150805  
Lab Number: C150805-10 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.017	J	mg/kg dry wt	0.010	1	08/14/2015	NP	1508097

"J" Qualifier indicates an estimated value



Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
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## ICPMS-PE DRC-II

Batch 1508096 - 200.2 - TR Metals

Solid (dry wt basis)

ICPMS-PE DRC-II

## Method Blank (1508096-BLK2)

Dilution Factor: 5

Prepared: 08/13/15 Analyzed: 08/14/15

Vanadium	< 1000	1500	ug/kg dry wt
Chromium	< 500	1000	"
Cobalt	< 50.0	100	"
Nickel	< 250	500	"
Copper	< 250	500	"
Arsenic	< 250	1000	"
Selenium	< 500	1000	"
Molybdenum	< 500	500	"
Silver	< 250	500	"
Cadmium	< 50.0	100	"
Antimony	< 250	500	"
Barium	< 250	500	"
Thallium	< 250	500	"
Lead	< 50.0	100	"

## Duplicate (1508096-DUP2)

Dilution Factor: 1

Source: C150805-03

Prepared: 08/13/15 Analyzed: 08/14/15

Vanadium	14450	3000	ug/kg dry wt	15950	10	35
Chromium	5527	2000	"	6091	10	35
Cobalt	8244	200	"	8214	0.4	35
Nickel	6729	1000	"	7045	5	35
Copper	69440	1000	"	74710	7	35
Arsenic	9090	2000	"	9239	2	35
Selenium	< 1000	2000	"	< 1000		35
Molybdenum	2526	1000	"	2562	1	35
Silver	1374	1000	"	864.6	45	35
Cadmium	2131	200	"	2346	10	35
Antimony	832.9	1000	"	1374	49	35
Barium	96820	1000	"	99360	3	35
Thallium	< 500	1000	"	< 500		35
Lead	205000	200	"	202800	1	35

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	% R Limits	% D or RPD	% D or RPD Limit
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Batch 1508096 - 200.2 - TR Metals

Solid (dry wt basis)

ICPMS-PE DRC-II

Matrix Spike (1508096-MS2)

Dilution Factor: 1

Source: C150805-03

Prepared: 08/13/15 Analyzed: 08/14/15

Vanadium	41030	3000	ug/kg dry wt	30000	15950	84	70-130		
Chromium	41060	2000	"	40000	6091	87	70-130		
Cobalt	25930	200	"	20000	8214	89	70-130		
Nickel	50060	1000	"	50000	7045	86	70-130		
Copper	94440	1000	"	30000	74710	66	70-130		
Arsenic	85470	2000	"	80000	9239	95	70-130		
Selenium	200900	2000	"	200000	< 1000	100	70-130		
Molybdenum	40060	1000	"	40000	2562	94	70-130		
Silver	8261	1000	"	7500	864.6	99	70-130		
Cadmium	21910	200	"	20000	2346	98	70-130		
Antimony	63440	1000	"	80000	1374	78	70-130		
Barium	126200	1000	"	20000	99360	134	70-130		
Thallium	186600	1000	"	200000	< 500	93	70-130		
Lead	298800	200	"	100000	202800	96	70-130		

Reference (1508096-SRM2)

Dilution Factor: 2

Prepared: 08/13/15 Analyzed: 08/14/15

Vanadium	62560	12000	ug/kg dry wt	65800		95	80-120		
Chromium	95490	8000	"	96500		99	80-120		
Cobalt	137500	800	"	140000		98	80-120		
Nickel	52860	4000	"	56800		93	76.5-123.4		
Copper	6000000	4000	"	6680000		90	80-120		
Arsenic	970300	8000	"	930000		104	65-134		
Selenium	43380	8000	"	37000		117	48-152		
Silver	18870	4000	"	20900		90	64-136		
Cadmium	44090	800	"	41600		106	77-123		
Antimony	275300	4000	"	213000		129	61-139		
Barium	5183	4000	"	5300		98	48-152		
Thallium	34790	4000	"	38100		91	64.5-135		
Lead	216700	800	"	224000		97	75-125		

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
Batch 1508100 - 1508096				Solid (dry wt basis)				ICPMS-PE DRC-II	
Serial Dilution (1508100-SRD1)		Dilution Factor: 5		Source: C150805-03		Prepared: 08/13/15 Analyzed: 08/14/15			
Vanadium	18060	15000	ug/kg dry wt		15950			12	10
Chromium	6486	9990	"		6091			6	10
Cobalt	8569	999	"		8214			4	10
Nickel	6888	5000	"		7045			2	10
Copper	80000	5000	"		74710			7	10
Arsenic	9014	9990	"		9239			2	10
Selenium	< 5000	9990	"		< 1,000.00				10
Molybdenum	< 5000	5000	"		2562				10
Silver	< 2500	5000	"		864.6				10
Cadmium	2505	999	"		2346			7	10
Antimony	< 2500	5000	"		1374				10
Barium	99160	5000	"		99360			0.2	10
Thallium	< 2500	5000	"		< 500.00				10
Lead	203500	999	"		202800			0.4	10

## ICPOE - PE Optima

Batch 1508096 - 200.2 - TR Metals			Solid (dry wt basis)		ICPOE - PE Optima	
Method Blank (1508096-BLK1)		Dilution Factor: 1		Prepared: 08/13/15 Analyzed: 08/14/15		
Aluminum	< 2.00	5.00	mg/kg dry wt			
Beryllium	< 0.100	0.500	"			
Calcium	< 10.0	25.0	"			
Iron	< 10.0	25.0	"			
Potassium	< 25.0	100	"			
Magnesium	< 10.0	25.0	"			
Manganese	< 0.200	0.500	"			
Sodium	< 25.0	100	"			
Zinc	1.0496	2.00	"			

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
Batch 1508096 - 200.2 - TR Metals				Solid (dry wt basis)			ICPOE - PE Optima		
Duplicate (1508096-DUP1)		Dilution Factor: 1		Source: C150805-03		Prepared: 08/13/15 Analyzed: 08/14/15			
Aluminum	5371.8	50.0	mg/kg dry wt		5397.8			0.5	35
Beryllium	< 1.00	5.00	"		< 1.00				35
Calcium	2589.5	250	"		3103.6			18	35
Iron	15980	250	"		17172			7	35
Potassium	642.42	1000	"		664.98			3	35
Magnesium	3206.6	250	"		3316.2			3	35
Manganese	2168.6	5.00	"		2213.7			2	35
Sodium	< 250	1000	"		< 250				35
Zinc	772.54	20.0	"		827.92			7	35
Matrix Spike (1508096-MS1)		Dilution Factor: 1		Source: C150805-03		Prepared: 08/13/15 Analyzed: 08/14/15			
Aluminum	5584.9	50.0	mg/kg dry wt	200	5397.8	94	70-130		
Beryllium	19.412	5.00	"	20.0	< 1.00	97	70-130		
Calcium	2756.0	250	"	100	3103.6	NR	70-130		
Iron	16533	250	"	300	17172	NR	70-130		
Potassium	1540.4	1000	"	1000	664.98	88	70-130		
Magnesium	3352.4	250	"	200	3316.2	18	70-130		
Manganese	2218.8	5.00	"	20.0	2213.7	25	70-130		
Sodium	330.51	1000	"	300	< 250	110	70-130		
Zinc	817.11	20.0	"	20.0	827.92	NR	70-130		
Reference (1508096-SRM1)		Dilution Factor: 5				Prepared: 08/13/15 Analyzed: 08/14/15			
Aluminum	269.18	50.0	mg/kg dry wt	309		87	63-137		
Beryllium	19.633	5.00	"	18.8		104	82-118		
Calcium	189580	250	"	184000		103	78-122		
Iron	21969	250	"	21000		105	80-120		
Potassium	< 250	1000	"	102			0-370		
Magnesium	105620	250	"	113000		93	80-120		
Manganese	220.83	5.00	"	201		110	80-120		
Sodium	< 250	1000	"	92.8			0-299		
Zinc	212.31	20.0	"	175		121	73-127		

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## Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
Batch 1508099 - 1508096				Solid (dry wt basis)				ICPOE - PE Optima	
Serial Dilution (1508099-SRD1)		Dilution Factor: 5		Source: C150805-03		Prepared: 08/13/15 Analyzed: 08/14/15			
Aluminum	5550.2	250	mg/kg dry wt		5397.8			3	10
Beryllium	< 5.00	25.0	"		< 1.00				10
Calcium	3159.4	1250	"		3103.6			2	10
Iron	17111	1250	"		17172			0.4	10
Potassium	< 1250	5000	"		664.98				10
Magnesium	3571.3	1250	"		3316.2			7	10
Manganese	2199.0	25.0	"		2213.7			0.7	10
Sodium	< 1250	5000	"		< 250.00				10
Zinc	762.22	99.9	"		827.92			8	10

NOTE: %R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level.  
 RPD = Relative Percent Difference %D = % Difference. DL = Detection Limit for QC sample

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

Mercury only (Total) by EPA 245.1 / 7470A Method - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%D or RPD	%D or RPD Limit
NIC MA-3000									
Batch 1508097 - No Lab Prep Req'd			Soil	NIC MA-3000					
Method Blank (1508097-BLK1)		Dilution Factor: 1			Prepared & Analyzed: 08/14/15				
Mercury	< 0.010	0.020	mg/kg dry wt						
Duplicate (1508097-DUP1)		Dilution Factor: 1			Source: C150805-03		Prepared & Analyzed: 08/14/15		
Mercury	0.0169	0.020	mg/kg dry wt		0.0175			4	35
Matrix Spike (1508097-MS1)		Dilution Factor: 1			Source: C150805-03		Prepared & Analyzed: 08/14/15		
Mercury	0.2039	0.020	mg/kg dry wt	0.198	0.0175	94	80-120		
Matrix Spike Dup (1508097-MSD1)		Dilution Factor: 1			Source: C150805-03		Prepared & Analyzed: 08/14/15		
Mercury	0.2046	0.020	mg/kg dry wt	0.197	0.0175	95	80-120	0.3	20
Reference (1508097-SRM1)		Dilution Factor: 1			Prepared & Analyzed: 08/14/15				
Mercury	7.003	0.228	mg/kg dry wt	6.45		109	75-125		

NOTE: %R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level.  
 RPD = Relative Percent Difference %D = % Difference, DL = Detection Limit for QC sample

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8  
**INORGANIC ANALYSES DATA SHEET**  
**Initial and Continuing Calibration Blanks**

Analytical Method: 7473

Analysis Name: TM\_Mercury 7473

Instrument: NIC MA-3000

Work Order: Nu C150805

Analytical Sequence: **Total**

Concentration Units: mg/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
		1	2	3	4	1508097-BLK1	NA	
Mercury		1.70	0.85			0.57	NA	0.02
		5	6	7	8			

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8  
**INORGANIC ANALYSES DATA SHEET**  
 Intial and Continuing Calibration Blanks

Analytical Method: EPA 200.2/200.7

Analysis Name: ICPOE Tot. Rec. Metals

Instrument: ICPOE - PE Optima

Work Order: Nu C150805

Analytical Sequence: 1508099 Total Recoverable

Concentration Units: mg/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Aluminum	10.64	1	2	3	4	1508096-BLK1	NA	5.00
		-1.10	3.99			12.51	NA	
		5	6	7	8			
Beryllium	0.60	1	2	3	4	1508096-BLK1	NA	0.50
		-0.88	-0.65			-0.91	NA	
		5	6	7	8			
Calcium	-0.74	1	2	3	4	1508096-BLK1	NA	25.00
		-6.82	-5.77			55.84	NA	
		5	6	7	8			
Iron	9.04	1	2	3	4	1508096-BLK1	NA	25.00
		7.98	12.54			74.80	NA	
		5	6	7	8			
Potassium	50.67	1	2	3	4	1508096-BLK1	NA	100.00
		2.25	23.95			11.28	NA	
		5	6	7	8			
Magnesium	9.53	1	2	3	4	1508096-BLK1	NA	25.00
		2.43	1.66			39.90	NA	
		5	6	7	8			
Manganese	0.70	1	2	3	4	1508096-BLK1	NA	0.50
		0.26	0.49			-0.91	NA	
		5	6	7	8			
Sodium	13.39	1	2	3	4	1508096-BLK1	NA	100.00
		-0.93	0.50			18.04	NA	
		5	6	7	8			



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Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8  
**INORGANIC ANALYSES DATA SHEET**  
**Intial and Continuing Calibration Blanks**

Analytical Method: EPA 200.2/200.7

Analysis Name: ICPOE Tot. Rec. Metals

Instrument: ICPOE - PE Optima

Work Order: Nu C150805

Analytical Sequence: 1508099 **Total Recoverable**

Concentration Units: mg/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
		1	2	3	4	1508096-BLK1	NA	
Zinc	9.71	-6.81	-9.78			10.50	NA	2.00
		5	6	7	8			

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8  
**INORGANIC ANALYSES DATA SHEET**  
 Intial and Continuing Calibration Blanks

Analytical Method: EPA 200.2 / 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Instrument: ICPMS-PE DRC-II

Work Order: Nu C150805

Analytical Sequence: 1508100 Total Recoverable

Concentration Units: ug/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Vanadium	0.04	1	2	3	4	NA	1508096-BLK2	300.00
		0.13	0.16			NA	0.40	
		5	6	7	8			
Chromium	0.02	1	2	3	4	NA	1508096-BLK2	200.00
		0.05	0.03			NA	0.29	
		5	6	7	8			
Cobalt	0.01	1	2	3	4	NA	1508096-BLK2	20.00
		0.00	0.00			NA	-0.02	
		5	6	7	8			
Nickel	-0.03	1	2	3	4	NA	1508096-BLK2	100.00
		0.04	0.01			NA	-0.03	
		5	6	7	8			
Copper	0.02	1	2	3	4	NA	1508096-BLK2	100.00
		0.02	0.02			NA	0.01	
		5	6	7	8			
Arsenic	-0.18	1	2	3	4	NA	1508096-BLK2	200.00
		0.01	-0.22			NA	-0.26	
		5	6	7	8			
Selenium	0.07	1	2	3	4	NA	1508096-BLK2	200.00
		-0.10	0.41			NA	0.23	
		5	6	7	8			
Molybdenum	0.04	1	2	3	4	NA	1508096-BLK2	100.00
		0.00	0.03			NA	0.11	
		5	6	7	8			

Project Name: Upper Animas\_SED 5\_AUG 2015\_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8  
**INORGANIC ANALYSES DATA SHEET**  
 Intial and Continuing Calibration Blanks

Analytical Method: EPA 200.2 / 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Instrument: ICPMS-PE DRC-II

Work Order: Nu C150805

Analytical Sequence: 1508100 Total Recoverable

Concentration Units: ug/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Silver	0.01	1	2	3	4	NA	1508096-BLK2	100.00
		0.01	0.02			NA	0.00	
		5	6	7	8			
Cadmium	0.01	1	2	3	4	NA	1508096-BLK2	20.00
		-0.01	0.01			NA	-0.01	
		5	6	7	8			
Antimony	0.11	1	2	3	4	NA	1508096-BLK2	100.00
		0.21	0.19			NA	-0.01	
		5	6	7	8			
Barium	0.00	1	2	3	4	NA	1508096-BLK2	100.00
		0.02	0.02			NA	-0.02	
		5	6	7	8			
Thallium	0.01	1	2	3	4	NA	1508096-BLK2	100.00
		0.08	0.05			NA	-0.05	
		5	6	7	8			
Lead	0.02	1	2	3	4	NA	1508096-BLK2	20.00
		0.02	0.02			NA	-0.01	
		5	6	7	8			

TDF #: A-098

## TechLaw, Inc. - ESAT Region 8

## Initial and Continuing Calibration Verification Results

NIC MA-3000

Method: 7473

Analysis Name: TM\_Mercury 7473

Sequence: 1508098

Work Order: C150805

Units: mg/kg dry wt

Total Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Mercury	100	106.2	106.2	1			2			3		
				100	99.45	99.5	100	97.19	97.2	100	97.57	97.6
				4			5			6		
				7			8			9		

Metals - ICV &amp; CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

## TechLaw, Inc. - ESAT Region 8

## Initial and Continuing Calibration Verification Results

ICPOE - PE Optima

Method: EPA 200.2/200.7

Analysis Name: ICPOE Tot. Rec. Metals

Sequence: 1508099

Work Order: C150805

Units: mg/kg dry wt

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Aluminum	12500	12203	97.6		1			2			3	
				12500	12401	99.2	12500	12440	99.5			
					4			5			6	
					7			8			9	
Beryllium	500	513.30	102.7		1			2			3	
				500	508.25	101.7	500	505.19	101.0			
					4			5			6	
					7			8			9	
Calcium	12500	12723	101.8		1			2			3	
				12500	12274	98.2	12500	12389	99.1			
					4			5			6	
					7			8			9	
Iron	12500	12465	99.7		1			2			3	
				12500	12182	97.5	12500	12316	98.5			
					4			5			6	
					7			8			9	
Magnesium	12500	12374	99.0		1			2			3	
				12500	12489	99.9	12500	12419	99.4			
					4			5			6	
					7			8			9	
Manganese	1000	1004.3	100.4		1			2			3	
				1000	1017.6	101.8	1000	1028.8	102.9			
					4			5			6	
					7			8			9	

TDF #: A-098

## TechLaw, Inc. - ESAT Region 8

## Initial and Continuing Calibration Verification Results

ICPOE - PE Optima

Method: EPA 200.2/200.7

Analysis Name: ICPOE Tot. Rec. Metals

Sequence: 1508099

Work Order: C150805

Units: mg/kg dry wt

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Potassium	25000	24424	97.7	1			2			3		
				25000	25025	100.1	25000	24424	97.7			
				4			5			6		
		7			8			9				
Sodium	12500	12160	97.3	1			2			3		
				12500	12507	100.1	12500	12286	98.3			
				4			5			6		
		7			8			9				
Zinc	2500	2523.7	100.9	1			2			3		
				2500	2660.3	106.4	2500	2751.2	110.0			
				4			5			6		
		7			8			9				

Metals - ICV &amp; CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

## TechLaw, Inc. - ESAT Region 8

## Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: EPA 200.2 / 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508100

Work Order: C150805

Units: ug/kg dry wt

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Antimony	50.0	48.4	96.8		1			2			3	
				50.0	48.1	96.2	50.0	49.0	98.0			
					4			5			6	
					7			8			9	
Arsenic	50.0	48.5	97.0		1			2			3	
				50.0	50.5	101.0	50.0	49.3	98.6			
					4			5			6	
					7			8			9	
Barium	50.0	49.3	98.6		1			2			3	
				50.0	49.7	99.4	50.0	49.9	99.8			
					4			5			6	
					7			8			9	
Cadmium	50.0	48.2	96.4		1			2			3	
				50.0	47.2	94.4	50.0	48.9	97.8			
					4			5			6	
					7			8			9	
Chromium	50.0	48.3	96.6		1			2			3	
				50.0	47.5	95.0	50.0	49.1	98.2			
					4			5			6	
					7			8			9	
Cobalt	50.0	49.7	99.4		1			2			3	
				50.0	49.3	98.6	50.0	50.4	100.8			
					4			5			6	
					7			8			9	

TDF #: A-098

## TechLaw, Inc. - ESAT Region 8

## Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: EPA 200.2 / 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508100

Work Order: C150805

Units: ug/kg dry wt

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Copper	50.0	50.7	101.4		1			2			3	
				50.0	49.5	99.0	50.0	49.6	99.2			
					4			5			6	
					7			8			9	
Lead	50.0	49.3	98.6		1			2			3	
				50.0	49.7	99.4	50.0	49.3	98.6			
					4			5			6	
					7			8			9	
Molybdenum	50.0	48.8	97.6		1			2			3	
				50.0	47.5	95.0	50.0	48.2	96.4			
					4			5			6	
					7			8			9	
Nickel	50.0	49.1	98.2		1			2			3	
				50.0	48.7	97.4	50.0	49.8	99.6			
					4			5			6	
					7			8			9	
Selenium	50.0	50.2	100.4		1			2			3	
				50.0	51.0	102.0	50.0	50.0	100.0			
					4			5			6	
					7			8			9	
Silver	50.0	49.4	98.8		1			2			3	
				50.0	48.9	97.8	50.0	48.8	97.6			
					4			5			6	
					7			8			9	



TDF #: A-098

## TechLaw, Inc. - ESAT Region 8

## Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: EPA 200.2 / 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508100

Work Order: C150805

Units: ug/kg dry wt

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Thallium	50.0	48.6	97.2		1			2			3	
				50.0	50.2	100.4	50.0	49.1	98.2			
					4			5			6	
					7			8			9	
Vanadium	50.0	48.5	97.0		1			2			3	
				50.0	47.5	95.0	50.0	48.4	96.8			
					4			5			6	
					7			8			9	

Metals - ICV &amp; CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria - ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8  
ICP Interference Check Sample  
ICPMS-PE DRC-II

<u>Analyte</u>	<u>Check Sample</u>	<u>Result*</u>	<u>Units</u>	<u>True</u>	<u>%R</u>	<u>PQL</u>
Sequence: 1508100 Analysis: ICPMS Tot. Rec. Metals						
Antimony	IFA1	0.1	ug/L			1.0
	IFB1	0.0	ug/L			1.0
Arsenic	IFA1	-0.1	ug/L			2.0
	IFB1	19.6	ug/L	20	98	2.0
Barium	IFA1	0.0	ug/L			1.0
	IFB1	0.1	ug/L			1.0
Cadmium	IFA1	0.0	ug/L			0.2
	IFB1	19.7	ug/L	20	98	0.2
Chromium	IFA1	0.1	ug/L			2.0
	IFB1	20.2	ug/L	20	101	2.0
Cobalt	IFA1	0.0	ug/L			0.2
	IFB1	20.4	ug/L	20	102	0.2
Copper	IFA1	0.9	ug/L			1.0
	IFB1	21.2	ug/L	20	106	1.0
Lead	IFA1	0.0	ug/L			0.2
	IFB1	0.0	ug/L			0.2
Molybdenum	IFA1	195.7	ug/L	200	98	1.0
	IFB1	194.6	ug/L	200	97	1.0
Nickel	IFA1	-0.2	ug/L			1.0
	IFB1	20.2	ug/L	20	101	1.0
Selenium	IFA1	0.1	ug/L			2.0
	IFB1	-0.4	ug/L			2.0
Silver	IFA1	0.0	ug/L			1.0
	IFB1	19.5	ug/L	20	97	1.0
Thallium	IFA1	0.0	ug/L			1.0
	IFB1	0.0	ug/L			1.0
Vanadium	IFA1	-0.1	ug/L			3.0
	IFB1	-0.4	ug/L			3.0

\*Criteria = 80-120%R of True Value or +/- PQL

See raw data for complete analyte list and results.

TDF #: A-098

## TechLaw, Inc. - ESAT Region 8

## ICP Interference Check Sample

## ICPOE - PE Optima

<u>Analyte</u>	<u>Check Sample</u>	<u>Result*</u>	<u>Units</u>	<u>True</u>	<u>%R</u>	<u>PQL</u>
Sequence: 1508099 Analysis: ICPOE Tot. Rec. Metals						
Aluminum	IFA1	60,997.4	ug/L	60,000	102	50.0
	IFB1	59,520.5	ug/L	60,000	99	50.0
Beryllium	IFA1	-0.8	ug/L			5.00
	IFB1	98.1	ug/L	100	98	5.00
Calcium	IFA1	306,420.1	ug/L	300,000	102	250
	IFB1	309,950.4	ug/L	300,000	103	250
Iron	IFA1	224,303.8	ug/L	250,000	90	250
	IFB1	225,593.2	ug/L	250,000	90	250
Magnesium	IFA1	144,315.7	ug/L	150,000	96	250
	IFB1	142,303.9	ug/L	150,000	95	250
Manganese	IFA1	-1.6	ug/L			5.00
	IFB1	193.3	ug/L	200	97	5.00
Potassium	IFA1	-499.5	ug/L			1000
	IFB1	19,896.5	ug/L	20,000	99	1000
Sodium	IFA1	51,380.3	ug/L	50,000	103	1000
	IFB1	49,322.8	ug/L	50,000	99	1000
Zinc	IFA1	8.4	ug/L			20.0
	IFB1	280.9	ug/L	300	94	20.0

\*Criteria = 80-120%R of True Value or +/- PQL

See raw data for complete analyte list and results.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8				
Detection Limit (PQL) Standard				
NIC MA-3000				
Mercury only (Total) by EPA 245.1 / 7470A Method				
Sequence: 1508098				
<u>Analyte</u>	<u>True</u>	<u>Found</u>	<u>%R</u>	<u>Units</u>
Mercury	100	11.89	12	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, &amp; Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg &amp; Na.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8 Detection Limit (PQL) Standard ICPMS-PE DRC-II				
Metals (Total Recov) by EPA 200/7000 Series Methods				
Sequence: 1508100				
Analyte	True	Found	%R	Units
Antimony	1.00	1.0	101	ug/L
Arsenic	2.00	2.0	100	ug/L
Barium	10.0	9.2	92	ug/L
Cadmium	0.200	0.2	94	ug/L
Chromium	2.00	1.9	95	ug/L
Cobalt	0.200	0.2	87	ug/L
Copper	1.00	1.0	97	ug/L
Lead	0.200	0.2	84	ug/L
Molybdenum	1.00	0.9	88	ug/L
Nickel	1.00	1.0	97	ug/L
Selenium	2.00	1.8	90	ug/L
Silver	1.00	1.0	95	ug/L
Thallium	1.00	0.9	86	ug/L
Vanadium	2.00	1.9	96	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, &amp; Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg &amp; Na.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8 Detection Limit (PQL) Standard ICPOE - PE Optima				
Metals (Total Recov) by EPA 200/7000 Series Methods				
Sequence: 1508099				
Analyte	True	Found	%R	Units
Aluminum	100	96.607	97	ug/L
Beryllium	5.00	4.8697	97	ug/L
Calcium	250	209.61	84	ug/L
Iron	100	93.937	94	ug/L
Magnesium	1000	975.79	98	ug/L
Manganese	10.0	10.332	103	ug/L
Potassium	1000	978.35	98	ug/L
Sodium	1000	974.20	97	ug/L
Zinc	50.0	53.982	108	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, &amp; Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg &amp; Na.

TDF #: A-098

## TechLaw Inc, ESAT Region 8

## INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 7473

Total

Sequence ID#: 1508098

Instrument ID #: NIC MA-3000

Soil

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508098-ICV1	Initial Cal Check	08/14/15	09:04
1508098-CRL1	Instrument RL Check	08/14/15	09:04
1508098-CCV1	Calibration Check	08/14/15	09:04
1508097-BLK1	Blank	08/14/15	09:04
1508097-SRM1	Reference	08/14/15	09:04
C150805-03	GKMSE02	08/14/15	09:04
1508097-DUP1	Duplicate	08/14/15	09:04
1508097-MS1	Matrix Spike	08/14/15	09:04
1508097-MSD1	Matrix Spike Dup	08/14/15	09:04
C150805-01	Field Duplicate	08/14/15	09:04
C150805-02	GKMSE01	08/14/15	09:04
C150805-04	GKMSE03	08/14/15	09:04
C150805-05	GKMSE04	08/14/15	09:04
1508098-CCV2	Calibration Check	08/14/15	09:04
1508098-CCB1	Calibration Blank	08/14/15	09:04
C150805-06	GKMSE05	08/14/15	09:04
C150805-07	GKMSE06	08/14/15	09:04
C150805-08	GKMSE07	08/14/15	09:04
C150805-09	GKMSE08	08/14/15	09:04
C150805-10	GKMSE09	08/14/15	09:04
1508098-CCV3	Calibration Check	08/14/15	09:04
1508098-CCB2	Calibration Blank	08/14/15	09:04

TDF #: A-098

## TechLaw Inc, ESAT Region 8

## INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: EPA 200.2/200.7

Total Recoverable

Sequence ID#: 1508099

Instrument ID #: ICPOE - PE Optima

Solid (dry wt basis)

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508099-ICV1	Initial Cal Check	08/14/15	08:31
1508099-SCV1	Secondary Cal Check	08/14/15	08:34
1508099-ICB1	Initial Cal Blank	08/14/15	08:37
1508099-CRL1	Instrument RL Check	08/14/15	08:40
1508099-IFA1	Interference Check A	08/14/15	08:43
1508099-IFB1	Interference Check B	08/14/15	08:47
1508096-BLK1	Blank	08/14/15	08:51
1508096-SRM1	Reference	08/14/15	08:55
C150805-03	GKMSE02	08/14/15	08:58
1508096-DUP1	Duplicate	08/14/15	09:01
1508099-SRD1	Serial Dilution	08/14/15	09:04
1508096-MS1	Matrix Spike	08/14/15	09:07
C150805-01	Field Duplicate	08/14/15	09:11
C150805-02	GKMSE01	08/14/15	09:14
C150805-04	GKMSE03	08/14/15	09:17
1508099-CCV1	Calibration Check	08/14/15	09:23
1508099-CCB1	Calibration Blank	08/14/15	09:26
C150805-05	GKMSE04	08/14/15	09:29
C150805-06	GKMSE05	08/14/15	09:32
C150805-07	GKMSE06	08/14/15	09:35
C150805-08	GKMSE07	08/14/15	09:39
C150805-09	GKMSE08	08/14/15	09:42
C150805-10	GKMSE09	08/14/15	09:45
1508099-CCV2	Calibration Check	08/14/15	09:51
1508099-CCB2	Calibration Blank	08/14/15	09:54



TDF #: A-098

## TechLaw Inc, ESAT Region 8

## INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: EPA 200.2 / 200.8

Total Recoverable

Sequence ID#: 1508100

Instrument ID #: ICPMS-PE DRC-II

Solid (dry wt basis)

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508100-ICV1	Initial Cal Check	08/14/15	10:04
1508100-SCV1	Secondary Cal Check	08/14/15	10:07
1508100-ICB1	Initial Cal Blank	08/14/15	10:10
1508100-CRL1	Instrument RL Check	08/14/15	10:13
1508100-IFA1	Interference Check A	08/14/15	10:17
1508100-IFB1	Interference Check B	08/14/15	10:20
1508096-BLK2	Blank	08/14/15	10:23
C150805-03	GKMSE02	08/14/15	10:27
1508096-DUP2	Duplicate	08/14/15	10:30
1508100-SRD1	Serial Dilution	08/14/15	10:33
1508096-SRM2	Reference	08/14/15	10:36
1508096-MS2	Matrix Spike	08/14/15	10:39
C150805-01	Field Duplicate	08/14/15	10:42
C150805-02	GKMSE01	08/14/15	10:45
C150805-04	GKMSE03	08/14/15	10:48
1508100-CCV1	Calibration Check	08/14/15	10:54
1508100-CCB1	Calibration Blank	08/14/15	10:58
C150805-05	GKMSE04	08/14/15	11:01
C150805-06	GKMSE05	08/14/15	11:04
C150805-07	GKMSE06	08/14/15	11:07
C150805-08	GKMSE07	08/14/15	11:10
C150805-09	GKMSE08	08/14/15	11:13
C150805-10	GKMSE09	08/14/15	11:16
1508100-CCV2	Calibration Check	08/14/15	11:22
1508100-CCB2	Calibration Blank	08/14/15	11:26